

CLAIMS

What is claimed is:

1. A plant for natural gas liquids recovery in which the plant is coupled with an LNG liquefaction plant, comprising

an absorber configured to receive an absorber feed stream and a first and a second reflux stream, and further configured to provide a bottom product stream;

a distillation column configured to receive a first portion of the bottom product stream and a second portion of the bottom product stream at different points, and wherein the distillation column is further configured to operate a pressure that is lower than an operating pressure in the absorber; and

a control unit that is configured to control a flow ratio of (a) the feed stream to the second reflux stream and (b) the first portion of the bottom product stream to the second portion of the bottom product stream, wherein the flow ratio is a function of desired ethane recovery in the distillation column bottom product stream.
2. The plant of claim 1 further comprising at least one of a heat exchanger and a reflux condenser that are configured to heat the first portion of the bottom product stream, and still further comprising an expansion device configured to cool the second portion of the bottom product stream.
3. The plant of claim 1 wherein the distillation column is configured to produce a distillation column overhead, and wherein the plant further comprises a compressor that compresses the distillation column overhead to at least absorber pressure.
4. The plant of claim 3 further comprising a cooling device thermally coupled to the distillation column overhead and configured to cool the compressed distillation column overhead.
5. The plant of claim 4 wherein the cooled compressed distillation column overhead is the first reflux.

6. The plant of claim 1 wherein the absorber is configured to produce an absorber overhead product that has a temperature of equal or lower than -90 °F and a pressure of between 500 psig and 700 psig.
7. The plant of claim 6 further comprising a compressor that is configured to receive the absorber overhead product and to compress the absorber overhead product to a pressure of at least 800 psig.
8. The plant of claim 7 wherein the compressor is operationally coupled to an expander that expands the absorber feed stream.
9. A method of processing a gas for delivery to an LNG liquefaction plant, comprising:

providing an absorber that receives an absorber feed stream and a first and a second reflux stream, and that produces a bottom product stream;

fluidly coupling the absorber to a distillation column such that a first portion of the bottom product stream and a second portion of the bottom product stream are fed to the distillation column at different points;

operating the distillation column at a pressure that is lower than an operating pressure of the absorber; and

controlling a flow ratio of (a) the feed stream to the second reflux stream and (b) the first portion of the bottom product stream to the second portion of the bottom product stream as a function of desired ethane recovery in the distillation column bottom product stream.
10. The method of claim 9 further comprising a step of feeding a distillation column overhead product to the absorber.
11. The method of claim 10 wherein the distillation column overhead product is compressed, cooled, and fed to the absorber as the first reflux stream.
12. The method of claim 9 wherein the distillation column is operated at a pressure between 300 psig and 500 psig, and wherein the absorber is operated at a pressure of between 500 psig and 800 psig.

13. The method of claim 9 further comprising a step of separating a cooled feed gas into a liquid portion and a vapor portion, and feeding the liquid portion after at least partial depressurization and warming into the distillation column.
14. The method of claim 13 wherein the vapor portion is split into a first and second stream to thereby form the second reflux stream and the absorber feed stream.
15. The method of claim 9 wherein the absorber produces a cryogenic absorber overhead stream, and further comprising a step of compressing the cryogenic absorber overhead stream to a pressure suitable for liquefaction.
16. The method of claim 15 wherein the step of compressing is driven by expansion of the absorber feed stream.
17. A method of variably recovering C₂ from a feed gas to a LNG liquefaction plant comprising:
 - feeding an expanded and heated liquid portion of a feed gas to a distillation column and feeding a vapor portion of the feed gas to an absorber;
 - adjusting a flow ratio of an absorber feed to a second reflux to the absorber, and using a first reflux that is provided by a distillation column overhead product to thereby control an absorber overhead temperature;
 - adjusting a temperature of an absorber bottom product that is fed to the distillation column to thereby control a distillation column overhead temperature; and
 - operating the absorber at a higher pressure than the distillation column.
18. The method of claim 17 wherein the step of adjusting the absorber bottom product temperature is performed by heating at least one portion of the absorber bottom product in a heat exchanger.
19. The method of claim 17 wherein the step of adjusting the absorber bottom product temperature is performed by cooling at least another portion of the absorber bottom product using a JT valve.

20. The method of claim 17 wherein the step of adjusting the flow ratio of the absorber feed to the second reflux to the absorber is a function of desired C2 recovery.